# PATENT ABSTRACTS OF JAPAN

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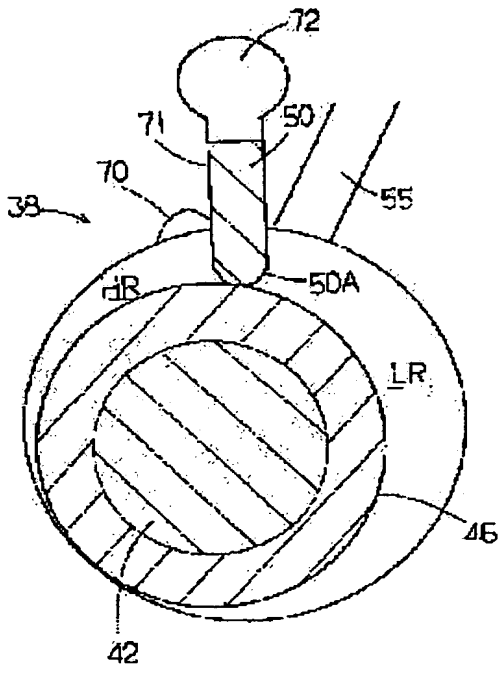
## (54) ROTARY COMPRESSOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a rotary compressor with increased reliability and compression efficiency of a vane.
SOLUTION: In this rotary compressor, an electric element and a rotating compression element driven by the electric element are installed in a closed container. The rotary compressor comprises: a roller 46 fitted to a cylinder 38 for forming the rotating compression element and an eccentric part 42 formed on the rotating shaft of the electric element and eccentrically rotated in the cylinder; the vane 50 allowed to abut on the roller and dividing the inside of the cylinder into a low pressure chamber side and a high pressure chamber side; a guide groove 71 formed in the cylinder to store the vane; and a back pressure chamber 72 formed in the cylinder and communicating with the guide groove to apply a back pressure to the vane. The cross sectional shape of the vane at the tip is formed in an arc shape, and the radius of the arc of the vane on the high pressure chamber side is lowered less than the radius of the arc on the low pressure chamber side.

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CLAIMS

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[Claim(s)]
[Claim 1] In the rotary compressor equipped with the electric element and the revolution compression element driven with this electric element in the well-closed container The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting said revolution compression element, and the revolving shaft of said electric element, and carries out an eccentric revolution within said cylinder, In order to be formed in the blade which divides the inside of said cylinder to a low-pressure-chamber and hyperbaric-chamber side in contact with this roller, the guide rail for being formed in said cylinder and containing said blade, and said cylinder and to apply back pressure to said blade, The rotary compressor characterized by making the radius of the radii by the side of said hyperbaric chamber of the blade concerned smaller than the radius of the radii by the side of said low pressure chamber while having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at said head of a blade as it is circular.
[Claim 2] In the rotary compressor equipped with the electric element and the revolution compression element driven with this electric element in the well-closed container The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting said revolution compression element, and the revolving shaft of said electric element, and carries out an eccentric revolution within said cylinder, In order to be formed in the blade which divides the inside of said cylinder to a low-pressure-chamber and hyperbaric-chamber side in contact with this roller, the guide rail for being formed in said cylinder and containing said blade, and said cylinder and to apply back pressure to said blade, The rotary compressor characterized by making the core of the radii concerned bias from the center of a blade to said low-pressure-chamber side while having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at said head of a blade as it is circular.
[Claim 3] It has an electric element and the 1st and 2nd revolution compression elements driven with this electric element in a well-closed container. The refrigerant gas compressed with said 1st revolution compression element is set in said well-closed container to discharge and the rotary compressor which compresses the refrigerant gas of this breathed-out intermediate pressure with said 2nd revolution compression element further. The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting said 2nd revolution compression element, and the revolving shaft of said electric element, and carries out an eccentric revolution within said cylinder, In order to be formed in the blade which divides the inside of said cylinder to a low-pressure-chamber and hyperbaric-chamber side in contact with

this roller, the guide rail for being formed in said cylinder and containing said blade, and said cylinder and to apply back pressure to said blade, The rotary compressor characterized by making the radius of the radii by the side of said hyperbaric chamber of the blade concerned smaller than the radius of the radii by the side of said low pressure chamber while having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at said head of a blade as it is circular.
[Claim 4] It has an electric element and the 1st and 2nd revolution compression elements driven with this electric element in a well-closed container. The refrigerant gas compressed with said 1st revolution compression element is set in said well-closed container to discharge and the rotary compressor which compresses the refrigerant gas of this breathed-out intermediate pressure with said 2nd revolution compression element further. The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting said 2nd revolution compression element, and the revolving shaft of said electric element, and carries out an eccentric revolution within said cylinder, In order to be formed in the blade which divides the inside of said cylinder to a low-pressure-chamber and hyperbaric-chamber side in contact with this roller, the guide rail for being formed in said cylinder and containing said blade, and said cylinder and to apply back pressure to said blade, The rotary compressor characterized by making the core of the radii concerned bias from the center of a blade to said low-pressure-chamber side while having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at said head of a blade as it is circular.
[Claim 5] Said revolution compression element is the rotary compressor of claim 1 characterized by compressing CO2 refrigerant, claim 2, claim 3, or claim 4.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention is equipped with an electric element and the revolution compression element driven with this electric element in a well-closed container, and relates to the rotary compressor which compresses and carries out the regurgitation of the refrigerant gas with the revolution compression element concerned.
[0002]
[Description of the Prior Art] This conventional seed rotary compressor, especially the rotary compressor of an internal intermediate pressure mold multistage-compression type are shown in JP,2-294587,A (F04C 23/00). That is, in the rotary compressor to apply; a refrigerant gas is inhaled from the intake port of the 1st revolution compression element at the low-pressure-chamber side of a cylinder, and it is compressed by actuation of a roller and a blade, becomes intermediate pressure, and is breathed out in a well-closed container through a regurgitation port and a regurgitation silence room from the hyperbaric-chamber side of a cylinder. And the gas of the intermediate pressure in this well-closed container is inhaled from the intake port of the 2nd

revolution compression element at the low-pressure-chamber side of a cylinder, the 2nd step of compression is performed by actuation of a roller and a blade, and it turns into gas of elevated-temperature high voltage, and is breathed out through a regurgitation port and a regurgitation silence room from a hyperbaric-chamber side.

[0003] The gas breathed out from the rotary compressor flows into the radiator of a refrigerant circuit etc., after it radiates heat, it is extracted by the expansion valve, carries out endoergic with an evaporator, and repeats the cycle inhaled by the 1st revolution compression element of a rotary compressor.

[0004] Moreover, when the large refrigerant of a height pressure deficit, for example, a carbon dioxide, (CO2) is used for the rotary compressor to apply as a refrigerant, the regurgitation refrigerant pressure force reaches 12MPaG(s) with the 2nd revolution compression element used as high voltage, and, on the other hand, serves as 8MPaG(s) (intermediate pressure) with the 1st revolution compression element which becomes a low stage side (the suction pressure of the 1st revolution compression element is 4MPa(s)).

[0005]

[Problem(s) to be Solved by the Invention] Here, the blade generally attached in the rotary compressor is inserted in the guide rail in which the cylinder was prepared radially free [ migration to radial / of a cylinder ]. And since it is necessary to force this blade on a roller side, the energization force by the spring and the structure which forces a blade on a roller with the back pressure from a back pressure room are taken from before, but with the 2nd revolution compression element of the rotary compressor of the internal intermediate pressure mentioned above, since the pressure in a cylinder becomes higher than the intermediate pressure in a well-closed container, the pressure in a well-closed container cannot be used as back pressure of a blade.

[0006] Then, although that discharge pressure will be impressed as back pressure of a blade with the 2nd revolution compression element, since the difference of high voltage and low voltage (in this case, intermediate pressure) becomes large like the above-mentioned, the force (planar pressure at a head) which forces a blade head on a roller becomes high, and dependability falls by wear at a head etc. Moreover, since the force taken for a roller to push in a blade also becomes large, there is a problem which has an adverse effect also on compressive ability. As for this, not only the multistage-compression-type rotary compressor mentioned above but a single cylinder type rotary compressor is the same.

[0007] Then, this invention is accomplished in order to solve the starting Prior-art-technical problem, and it aims at offering the rotary compressor which aimed at improvement in the dependability about a blade, and compression efficiency.

[0008]

[Means for Solving the Problem] Namely, it sets to the rotary compressor equipped with the electric element and the revolution compression element driven with this electric element in the well-closed container in invention of claim 1. The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting a revolution compression element, and the revolving shaft of an electric element, and carries out an eccentric revolution within a cylinder, In order to be formed in the blade which divides the inside of a cylinder to a low-pressure-chamber and hyperbaric-chamber side in contact with this roller, the guide rail for being formed in a cylinder and containing a blade, and a cylinder and to apply back pressure to a blade, While having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at the head of a blade as it is circular, it is characterized by making the radius of the radii by the side of the hyperbaric chamber of the blade concerned smaller than the radius of the radii by the side of a low pressure chamber.

[0009] In the rotary compressor equipped with the electric element and the revolution compression element driven with this electric element in the well-closed container in invention of claim 2 The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting a revolution compression element, and the revolving shaft of an electric element, and carries out an eccentric revolution within a cylinder, In order to be formed in the blade which divides the inside of a cylinder to a low-pressure-chamber and hyperbaric-chamber side in

contact with this roller, the guide rail for being formed in a cylinder and containing a blade, and a cylinder and to apply back pressure to a blade, While having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at the head of a blade as it is circular, it is characterized by making the core of the radii concerned bias from the center of a blade to a low-pressure-chamber side.

[0010] In invention of claim 3, it has an electric element and the 1st and 2nd revolution compression elements driven with this electric element in a well-closed container. The refrigerant gas compressed with the 1st revolution compression element is set in a well-closed container to discharge and the rotary compressor which compresses the refrigerant gas of this breathed-out intermediate pressure with the 2nd revolution compression element further. The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting the 2nd revolution compression element, and the revolving shaft of an electric element, and carries out an eccentric revolution within a cylinder, In order to be formed in the blade which divides the inside of a cylinder to a low-pressure-chamber and hyperbaric-chamber side in contact with this roller, the guide rail for being formed in a cylinder and containing a blade, and a cylinder and to apply back pressure to a blade, While having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at the head of a blade as it is circular, it is characterized by making the radius of the radii by the side of the hyperbaric chamber of the blade concerned smaller than the radius of the radii by the side of a low pressure chamber.

[0011] In invention of claim 4, it has an electric element and the 1st and 2nd revolution compression elements driven with this electric element in a well-closed container. The refrigerant gas compressed with the 1st revolution compression element is set in a well-closed container to discharge and the rotary compressor which compresses the refrigerant gas of this breathed-out intermediate pressure with the 2nd revolution compression element further. The roller which fitting is carried out to the eccentric section formed in the cylinder for constituting the 2nd revolution compression element, and the revolving shaft of an electric element, and carries out an eccentric revolution within a cylinder, In order to be formed in the blade which divides the inside of a cylinder to a low-pressure-chamber and hyperbaric-chamber side in contact with this roller, the guide rail for being formed in a cylinder and containing a blade, and a cylinder and to apply back pressure to a blade, While having the back pressure room which is open for free passage to a guide rail and accomplishing the cross-section configuration at the head of a blade as it is circular, it is characterized by making the core of the radii concerned bias from the center of a blade to a low-pressure-chamber side.

[0012]

[Embodiment of the Invention] Next, based on a drawing, the operation gestalt of this invention is explained in full detail. Drawing 1 is the vertical section side elevation of the internal intermediate pressure mold multistage (two steps) compression equation rotary compressor 10 equipped with the 1st and 2nd revolution compression elements as an example of the rotary compressor of this invention.

[0013] It is the internal intermediate pressure mold multistage-compression type rotary compressor with which 10 uses a carbon dioxide ($CO_2$) as a refrigerant in this drawing. The cylinder-like well-closed container 12 with which this multistage-compression type rotary compressor 10 consists of a steel plate, It is arranged at the building envelope upside of this well-closed container 12 the electric element 14 by which arrangement receipt was carried out, and under this electric element 14. It consists of the revolution compression device sections 18 which consist of the 1st revolution compression element 32 (the 1st step) and the 2nd revolution compression element 34 (the 2nd step) which are driven with the revolving shaft 16 of the electric element 14.

[0014] Body of container 12A which a well-closed container 12 considers a pars basilaris ossis occipitalis as an oil reservoir, and contains the electric element 14 and the revolution compression device section 18, It consists of end cap (lid) 12B of the shape of **** which blockades up opening of this body of container 12A. And circular mounting hole 12D is formed centering on the top face of this end cap 12B, and the terminal (wiring is omitted) 20 for

supplying power to the electric element 14 is attached in this mounting hole 12D.
[0015] The electric element 14 consists of a stator 22 annularly attached along with the inner skin of the up space of a well-closed container 12, and Rota 24 by which prepared some spacing inside this stator 22, and insertion installation was carried out. This Rota 24 is being fixed to said revolving shaft 16 prolonged in the direction of a vertical through a core.
[0016] The stator 22 has the layered product 26 which carried out the laminating of the doughnut-like magnetic steel sheet, and the stator coil 28 around which the tooth part of this layered product 26 was looped by the direct volume (concentration volume) method. Moreover, it is formed by the layered product 30 of a magnetic steel sheet like a stator 22, and Rota 24 also lays a permanent magnet MG underground in this layered product 30, and is constituted.
[0017] The medium dashboard 36 is ****(ed) between said 1st revolution compression element 32 and the 2nd revolution compression element 34. Namely, the 1st revolution compression element 32 of the revolution compression device section 18 and the 2nd revolution compression element 34 The medium dashboard 36, and the cylinder 38 of the upside by which this medium dashboard 36 has been arranged up and down and the lower cylinder 40, The rollers 46 and 48 of the upper and lower sides which fitting is carried out to the eccentric sections 42 and 44 of the upper and lower sides which have the phase contrast of 180 degrees and were prepared in the revolving shaft 16, and carry out the eccentric revolution of the inside of the up-and-down cylinder 38 and 40, The blades 50 and 52 of the upper and lower sides which it is energized by coil springs 76 and 77 and back pressure, and a head is made to contact the rollers 46 and 48 of these upper and lower sides, respectively, and divide the inside of the up-and-down cylinder 38 and 40 to the hyperbaric-chamber side HR ( drawing 2 ) the low-pressure-chamber side LR, respectively, It consists of the up supporter material 54 and the lower supporter material 56 as supporter material which blockade the effective area of a cylinder 38 upside, and the effective area of the cylinder 40 bottom, and make the bearing of a revolving shaft 16 serve a double purpose.
[0018] On the other hand, in the up supporter material 54 and the lower supporter material 56, it is the intake port 55 ( drawing 2 .). the lower supporter material 56 -- not illustrating -- the cavity of the part is carried out to the interior of the up-and-down cylinders 38 and 40, and the intake path 60 (the up supporter material 54 is not shown) which is open for free passage, respectively, and the regurgitation silence rooms 62 and 64 formed by blockading this cavity by the arm top cover 66 and the discharge ring 68 are formed.
[0019] In addition, the regurgitation silence room 64 and the inside of a well-closed container 12 are opened for free passage on the free passage way which penetrates up-and-down cylinders 38 and 40 and the up-and-down medium dashboard 36, the interstage-outflow tubing 121 is set up by the upper bed of a free passage way, and the refrigerant of the intermediate pressure compressed with the 1st revolution compression element 32 from this interstage-outflow tubing 121 is breathed out in a well-closed container 12.
[0020] and this case -- as a refrigerant -- the earth -- it is environment-friendly, the carbon dioxide ($CO_2$) which is a natural refrigerant and which was mentioned above is used in consideration of inflammability, toxicity, etc., and, as for the oil as a lubricating oil, the oil of these **, such as straight mineral oil (mineral oil), an alkylbenzene oil, an ether oil, ester oil, and PAG (poly alkyl glycol), is used.
[0021] Welding immobilization of the sleeves 141, 142, 143, and 144 is carried out in the intake path 60 (an upside is not shown) of the up supporter material 54 and the lower supporter material 56, the regurgitation silence room 62, and the location corresponding to an arm-top-cover 66 upside (location which carries out an abbreviation response in the soffit of the electric element 14) at the side face of body of container 12A of a well-closed container 12, respectively. And insertion connection of the end of the refrigerant installation tubing 92 for introducing a refrigerant gas into a cylinder 38 in a sleeve 141 is made, and the end of this refrigerant installation tubing 92 is open for free passage with the intake path which a cylinder 38 does not illustrate. This refrigerant installation tubing 92 passes a well-closed container 12 upside, and results in a sleeve 144, insertion connection is made into a sleeve 144 and the other end opens it for free passage in a well-closed container 12.

[0022] Moreover, insertion connection of the end of the refrigerant installation tubing 94 for introducing a refrigerant gas into a cylinder 40 in a sleeve 142 is made, and the end of this refrigerant installation tubing 94 is open for free passage with the intake path 60 of a cylinder 40. The other end of this refrigerant installation tubing 94 is connected to the accumulator which is not illustrated. Moreover, into a sleeve 143, insertion connection of the refrigerant discharge tube 96 is made, and the end of this refrigerant installation tubing 96 is open for free passage with the regurgitation silence room 62.
[0023] Next, the structure of the blade 50 circumference of the revolution compression element 34 of the above 2nd is explained, referring to drawing 2 . Said regurgitation silence room 62, the regurgitation port 70 which is open for free passage through the discharge valve which is not illustrated, and the intake port 55 mentioned above are formed in the cylinder 38, it is located among these and the guide rail 71 which extends radially is formed in the cylinder 38. And said blade 50 is contained free [ sliding ] in this guide rail 71.
[0024] As mentioned above, a blade 50 makes the head contact a roller 46, and divides the inside of a cylinder 38 to the hyperbaric-chamber side HR the low-pressure-chamber side LR. And opening of the intake port 55 is carried out to this low-pressure-chamber side LR, and it is carrying out opening of the regurgitation port 70 to the hyperbaric-chamber side HR.
[0025] It is open for free passage to the guide rail 71 concerned on the outside (well-closed container 12 side) of a guide rail 71, and the back pressure room 72 is formed in the cylinder 38. Here, since the inside of a well-closed container 12 serves as intermediate pressure in the internal intermediate pressure mold multistage-compression type rotary compressor 10 of an example, with the 2nd revolution compression element 34, it cannot use as back pressure of a blade 50. Therefore, said regurgitation silence room 62 is open for free passage, and this back pressure room 72 impresses high-pressure back pressure to a blade 50 by it.
[0026] In addition, said coil spring 76 is contained in the stowage which extended on the outside of this guide rail 71 and the back pressure room 72, and was formed in the cylinder 38, and always energizes the head of a blade 50 to a roller 46 side in contact with the outside of a blade 50.
[0027] That is, a blade 50 is energized by the applied high voltage from the energization force and the back pressure room 72 of a coil spring 76 at a roller 46 side. In this case, as for head 50A of a blade 50, the cross section is presenting the radii configuration like drawing 2 . Moreover, the radius of these radii is made into a value which is different by the hyperbaric-chamber side HR the low-pressure-chamber side LR bordering on the center C of a blade 50 like drawing 3 , and the radius R2 of the radii by the side of [ HR ] the hyperbaric chamber is set up smaller than the radius R1 of the radii by the side of [ LR ] a low pressure chamber (R1> R2).
[0028] By the starting configuration, as for the surface area of head 50A of a blade 50, the part by the side of [ HR ] the hyperbaric chamber becomes larger than the part by the side of [ LR ] a low pressure chamber from Center C. It is constituted so that the pressure by the side of [ HR ] the hyperbaric chamber in a cylinder 38 (high voltage) may act on head 50A of a blade 50 more effectively by this.
[0029] The above configuration explains actuation below. If it energizes to the stator coil 28 of the electric element 14 through a terminal 20 and wiring which is not illustrated, the electric element 14 will start and Rota 24 will rotate. The rollers 46 and 48 of the upper and lower sides by which fitting was carried out to the eccentric sections 42 and 44 of the upper and lower sides prepared in a revolving shaft 16 and one by this revolution carry out the eccentric revolution of the inside of the up-and-down cylinder 38 and 40.
[0030] The low-pressure refrigerant inhaled at the low-pressure-chamber side of a cylinder 40 from the intake port which this does not illustrate via the intake path 60 formed in the refrigerant installation tubing 94 and the lower supporter material 56 is breathed out in a well-closed container 12 from the interstage-outflow tubing 121 through the free passage way which is compressed by actuation of a roller 48 and a blade 52, serves as intermediate pressure, and is not illustrated from the hyperbaric-chamber side of a cylinder 40. By this, the inside of a well-closed container 12 serves as intermediate pressure.
[0031] And the refrigerant gas of the intermediate pressure in a well-closed container 12 is

inhaled from the intake port 55 at the low-pressure-chamber a cylinder 38 side LR via the intake path which came out of the sleeve 144 and was formed in the refrigerant installation tubing 92 and the up supporter material 54 and which is not illustrated. The 2nd step of compression is performed by actuation of a roller 46 and a blade 50, and the refrigerant gas of the inhaled intermediate pressure turns into a hot and high-pressure refrigerant gas, and flows into the gas cooler which the exterior does not illustrate via the regurgitation silence room 62 and the refrigerant discharge tube 96 which were formed in the up supporter material 54 through the regurgitation port 70 from the hyperbaric-chamber side HR. After a refrigerant radiates heat by this gas cooler, it decompresses with the decompression device which is not illustrated and flows into the evaporator which does not illustrate this, either.

[0032] Then, a refrigerant evaporates and the cycle absorbed in the 1st revolution compression element 32 from the refrigerant installation tubing 94 through said accumulator is repeated after that.

[0033] In compression actuation with the 2nd revolution compression element 34, in this case, the surface area of head 50A of the blade 50 forced on a roller 46 like the above-mentioned in this invention Since he is trying for the direction of the part located in the hyperbaric-chamber side HR from the part located in the low-pressure-chamber side LR in a cylinder 38 to become large The pressure by the side of [ HR ] the hyperbaric chamber in a cylinder 38 acts to head 50A of a blade 50 effectively, and the blade pressure to the roller 46 by the pressure from the back pressure room 72 is eased.

[0034] Since the work to which a roller 46 stuffs a blade 50 into a guide rail 71 side also becomes light while a blade 50 can be forced on a roller 46 strongly beyond the need by this, canceling that planar pressure becomes high unusually and being able to raise now the dependability of head 50A of a blade 50, compression efficiency is also improved.

[0035] Moreover, since the low-pressure-chamber side LR and hyperbaric-chamber side HR is circular (radii differ), head 50A of a blade 50 does not have the thing to which head 50A of a blade 50 eats into a roller 46 and which it bites and a phenomenon produces, either.

[0036] Here, drawing 4 shows the configuration of head 50A of the blade 50 of other examples of this invention. In this case, although, as for head 50A of a blade 50, the cross section is presenting the radii configuration of a radius R as a whole, only the dimension S is biasing the core O of these radii from the center C of a blade 50 to the low-pressure-chamber side LR. By the starting configuration as well as the above-mentioned, as for the surface area of head 50A of a blade 50, it becomes widely from Center C the part [ the direction of the part by the side of / HR / the hyperbaric chamber ] by the side of [ LR ] a low pressure chamber. Thereby, the pressure by the side of [ HR ] the hyperbaric chamber in a cylinder 38 (high voltage) comes to act on head 50A of a blade 50 more effectively, and does so the same effectiveness as the above-mentioned.

[0037] Especially, since the radii radius of a blade 50 is uniform in this case, it is effective in processing of a blade 50 becoming easy.

[0038] In addition, although this invention was applied to the rotary compressor of an internal intermediate pressure mold multistage-compression type in the example, also in the rotary compressor of not only it but a single cylinder, this invention is effective. Moreover, the refrigerant to be used is not limited to a carbon dioxide (CO2) by claim 1 thru/or claim 4, either.

[0039]

[Effect of the Invention] As explained in full detail above, according to this invention, the direction of the part located in a hyperbaric-chamber side from the part to which the surface area at the head of a blade forced on a roller is located in the low-pressure-chamber side in a cylinder becomes large. While making the pressure by the side of the hyperbaric chamber in a cylinder act effectively at the head of a blade, easing the blade pressure to the roller by the pressure from a back pressure room by this and being able to raise the dependability at the head of a blade now, it becomes possible to also improve compression efficiency.

[0040] Moreover, since a low-pressure-chamber side and hyperbaric-chamber side is also circular, a blade head does not have the so-called thing to a roller which it bites and a phenomenon produces, either. Since high voltage will be especially impressed to a back pressure

room like claim 3 or claim 4 with the 2nd revolution compression element of the rotary compressor of an internal intermediate pressure mold multistage-compression type, this invention is very effective. Moreover, when a height pressure deficit compresses CO2 refrigerant which becomes large like claim 5, the effectiveness will become much more remarkable.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] It is drawing of longitudinal section of the internal intermediate pressure mold multistage-compression type rotary compressor of the example of this invention.
[Drawing 2] It is amplification plane-cross-section drawing of the blade part of the 2nd revolution compression element of drawing 1 .
[Drawing 3] It is the enlarged drawing of the blade point of drawing 2 .
[Drawing 4] It is the enlarged drawing of the blade point of other examples of this invention.
[Description of Notations]
10 Multistage-Compression Type Rotary Compressor
32 1st Revolution Compression Element
34 2nd Revolution Compression Element
38 Cylinder
42 Eccentric Section
46 Roller
50 Blade
71 Guide Rail
72 Back Pressure Room

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## DRAWINGS

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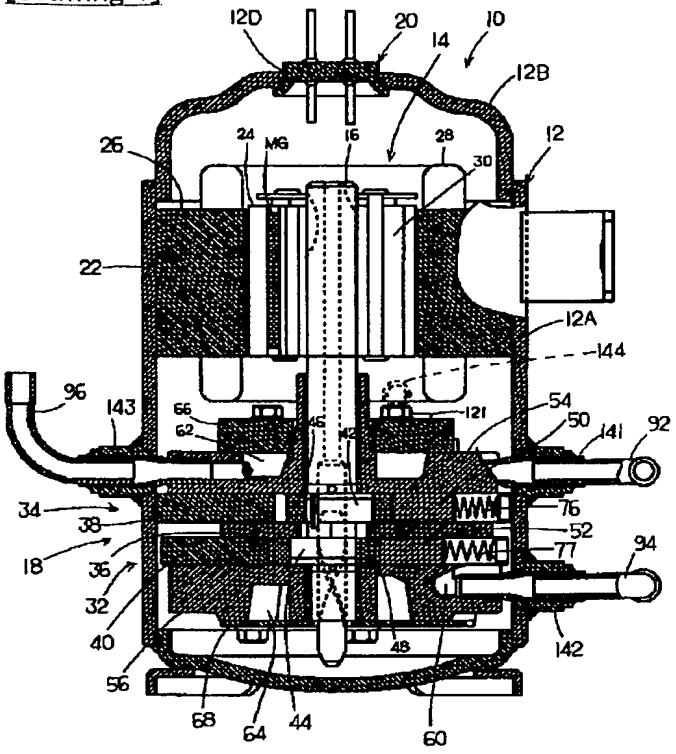
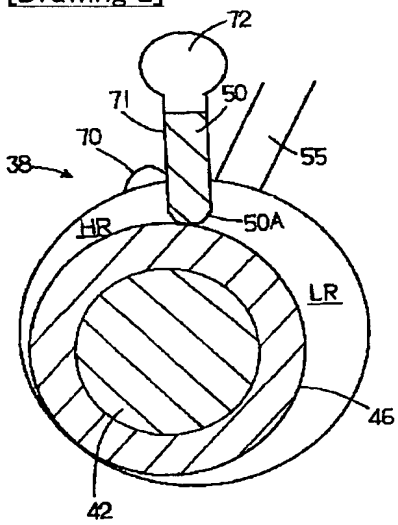
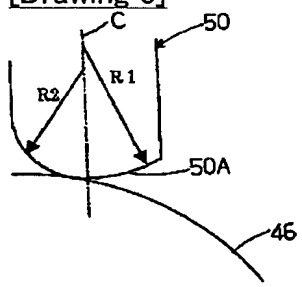
[Drawing 1]



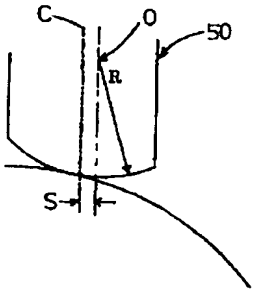

[Drawing 2]




[Drawing 3]




[Drawing 4]

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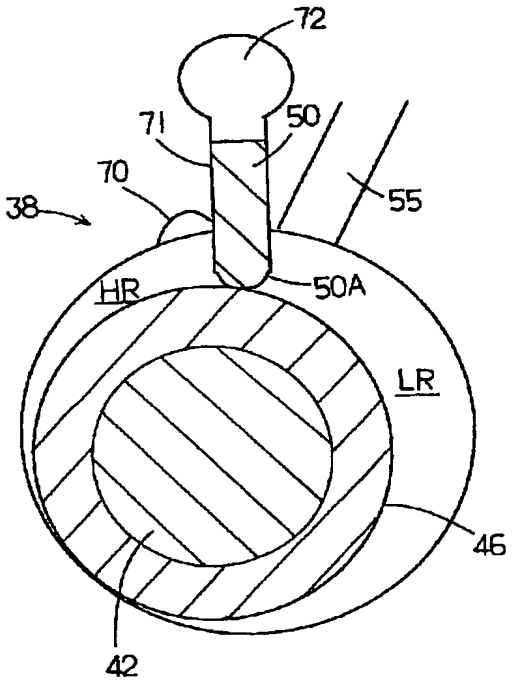
(54)【発明の名称】　ロータリコンプレッサ

(57)【要約】
【課題】　ベーンに関する信頼性と圧縮効率の向上を図ったロータリコンプレッサを提供する。
【解決手段】　密閉容器内に電動要素と、電動要素にて駆動される回転圧縮要素を備えたロータリコンプレッサにおいて、回転圧縮要素を構成するためのシリンダ３８及び電動要素の回転軸に形成された偏心部４２に嵌合されてシリンダ内で偏心回転するローラ４６と、このローラに当接してシリンダ内を低圧室側と高圧室側に区画するベーン５０と、シリンダに形成され、ベーンを収納するための案内溝７１と、シリンダに形成され、ベーンに背圧を加えるため、案内溝に連通する背圧室７２とを備え、ベーン先端の断面形状を円弧状と成すと共に、当該ベーンの高圧室側の円弧の半径を、低圧室側の円弧の半径よりも小さくした。



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【特許請求の範囲】

【請求項１】　密閉容器内に電動要素と、該電動要素にて駆動される回転圧縮要素を備えたロータリコンプレッサにおいて、

前記回転圧縮要素を構成するためのシリンダ及び前記電動要素の回転軸に形成された偏心部に嵌合されて前記シリンダ内で偏心回転するローラと、

該ローラに当接して前記シリンダ内を低圧室側と高圧室側に区画するベーンと、

前記シリンダに形成され、前記ベーンを収納するための案内溝と、

前記シリンダに形成され、前記ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、

前記ベーン先端の断面形状を円弧状と成すと共に、当該ベーンの前記高圧室側の円弧の半径を、前記低圧室側の円弧の半径よりも小さくしたことを特徴とするロータリコンプレッサ。

【請求項２】　密閉容器内に電動要素と、該電動要素にて駆動される回転圧縮要素を備えたロータリコンプレッサにおいて、

前記回転圧縮要素を構成するためのシリンダ及び前記電動要素の回転軸に形成された偏心部に嵌合されて前記シリンダ内で偏心回転するローラと、

該ローラに当接して前記シリンダ内を低圧室側と高圧室側に区画するベーンと、

前記シリンダに形成され、前記ベーンを収納するための案内溝と、

前記シリンダに形成され、前記ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、

前記ベーン先端の断面形状を円弧状と成すと共に、当該円弧の中心をベーンの中央より前記低圧室側に偏位させたことを特徴とするロータリコンプレッサ。

【請求項３】　密閉容器内に電動要素と、該電動要素にて駆動される第１及び第２の回転圧縮要素を備え、前記第１の回転圧縮要素で圧縮された冷媒ガスを前記密閉容器内に吐出し、更にこの吐出された中間圧の冷媒ガスを前記第２の回転圧縮要素で圧縮するロータリコンプレッサにおいて、

前記第２の回転圧縮要素を構成するためのシリンダ及び前記電動要素の回転軸に形成された偏心部に嵌合されて前記シリンダ内で偏心回転するローラと、

該ローラに当接して前記シリンダ内を低圧室側と高圧室側に区画するベーンと、

前記シリンダに形成され、前記ベーンを収納するための案内溝と、

前記シリンダに形成され、前記ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、

前記ベーン先端の断面形状を円弧状と成すと共に、当該ベーンの前記高圧室側の円弧の半径を、前記低圧室側の円弧の半径よりも小さくしたことを特徴とするロータリコンプレッサ。

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【請求項４】　密閉容器内に電動要素と、該電動要素にて駆動される第１及び第２の回転圧縮要素を備え、前記第１の回転圧縮要素で圧縮された冷媒ガスを前記密閉容器内に吐出し、更にこの吐出された中間圧の冷媒ガスを前記第２の回転圧縮要素で圧縮するロータリコンプレッサにおいて、

前記第２の回転圧縮要素を構成するためのシリンダ及び前記電動要素の回転軸に形成された偏心部に嵌合されて前記シリンダ内で偏心回転するローラと、

該ローラに当接して前記シリンダ内を低圧室側と高圧室側に区画するベーンと、

前記シリンダに形成され、前記ベーンを収納するための案内溝と、

前記シリンダに形成され、前記ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、

前記ベーン先端の断面形状を円弧状と成すと共に、当該円弧の中心をベーンの中央より前記低圧室側に偏位させたことを特徴とするロータリコンプレッサ。

【請求項５】　前記回転圧縮要素は$CO_2$冷媒を圧縮することを特徴とする請求項１、請求項２、請求項３又は請求項４のロータリコンプレッサ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、密閉容器内に電動要素と、該電動要素にて駆動される回転圧縮要素を備え、当該回転圧縮要素で冷媒ガスを圧縮して吐出するロータリコンプレッサに関するものである。

【０００２】

【従来の技術】従来のこの種ロータリコンプレッサ、特に内部中間圧型多段圧縮式のロータリコンプレッサは例えば特開平２－２９４５８７号公報（Ｆ０４Ｃ２３／００）に示されている。即ち、係るロータリコンプレッサでは、第１の回転圧縮要素の吸込ポートから冷媒ガスがシリンダの低圧室側に吸入され、ローラとベーンの動作により圧縮されて中間圧となりシリンダの高圧室側より吐出ポート、吐出消音室を経て密閉容器内に吐出される。そして、この密閉容器内の中間圧のガスは第２の回転圧縮要素の吸込ポートからシリンダの低圧室側に吸入され、ローラとベーンの動作により２段目の圧縮が行なわれて高温高圧のガスとなり、高圧室側より吐出ポート、吐出消音室を経て吐出される。

【０００３】ロータリコンプレッサから吐出されたガスは冷媒回路の放熱器などに流入し、放熱した後、膨張弁で絞られて蒸発器で吸熱し、ロータリコンプレッサの第１の回転圧縮要素に吸入されるサイクルを繰り返す。

【０００４】また、係るロータリコンプレッサに、高低圧差の大きい冷媒、例えば二酸化炭素（$CO_2$）を冷媒として用いた場合、吐出冷媒圧力は高圧となる第２の回転圧縮要素で１２ＭＰａＧに達し、一方、低段側となる

第１の回転圧縮要素で８ＭＰａＧ（中間圧）となる（第１の回転圧縮要素の吸込圧力は４ＭＰａ）。

【０００５】

【発明が解決しようとする課題】ここで、一般的にロータリコンプレッサに取り付けられたベーンは、シリンダの半径方向に設けられた案内溝にシリンダの半径方向に移動自在に挿入される。そして、このベーンはローラ側に押し付ける必要があるため、従来よりスプリングによる付勢力と背圧室からの背圧によってベーンをローラに押し付ける構造が取られているが、前述した内部中間圧のロータリコンプレッサの第２の回転圧縮要素では、シリンダ内の圧力が密閉容器内の中間圧より高くなるため、密閉容器内の圧力をベーンの背圧として利用することができない。

【０００６】そこで、第２の回転圧縮要素ではその吐出圧力をベーンの背圧として印加することになるが、前述の如く高圧と低圧（この場合は中間圧）との差が大きくなるため、ベーン先端をローラに押し付ける力（先端の面圧）が高くなり、先端の摩耗などによって信頼性が低下する。また、ローラがベーンを押し込むのに要される力も大きくなるため、圧縮性能にも悪影響を与える問題がある。これは上述した多段圧縮式のロータリコンプレッサに限らず、単シリンダタイプのロータリコンプレッサでも同様である。

【０００７】そこで、本発明は、係る従来の技術的課題を解決するために成されたものであり、ベーンに関する信頼性と圧縮効率の向上を図ったロータリコンプレッサを提供することを目的とする。

【０００８】

【課題を解決するための手段】即ち、請求項１の発明では、密閉容器内に電動要素と、この電動要素にて駆動される回転圧縮要素を備えたロータリコンプレッサにおいて、回転圧縮要素を構成するためのシリンダ及び電動要素の回転軸に形成された偏心部に嵌合されてシリンダ内で偏心回転するローラと、このローラに当接してシリンダ内を低圧室側と高圧室側に区画するベーンと、シリンダに形成され、ベーンを収納するための案内溝と、シリンダに形成され、ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、ベーン先端の断面形状を円弧状と成すと共に、当該ベーンの高圧室側の円弧の半径を、低圧室側の円弧の半径よりも小さくしたことを特徴とする。

【０００９】請求項２の発明では、密閉容器内に電動要素と、この電動要素にて駆動される回転圧縮要素を備えたロータリコンプレッサにおいて、回転圧縮要素を構成するためのシリンダ及び電動要素の回転軸に形成された偏心部に嵌合されてシリンダ内で偏心回転するローラと、このローラに当接してシリンダ内を低圧室側と高圧室側に区画するベーンと、シリンダに形成され、ベーンを収納するための案内溝と、シリンダに形成され、ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、ベーン先端の断面形状を円弧状と成すと共に、当該円弧の中心をベーンの中央より低圧室側に偏位させたことを特徴とする。

【００１０】請求項３の発明では、密閉容器内に電動要素と、この電動要素にて駆動される第１及び第２の回転圧縮要素を備え、第１の回転圧縮要素で圧縮された冷媒ガスを密閉容器内に吐出し、更にこの吐出された中間圧の冷媒ガスを第２の回転圧縮要素で圧縮するロータリコンプレッサにおいて、第２の回転圧縮要素を構成するためのシリンダ及び電動要素の回転軸に形成された偏心部に嵌合されてシリンダ内で偏心回転するローラと、このローラに当接してシリンダ内を低圧室側と高圧室側に区画するベーンと、シリンダに形成され、ベーンを収納するための案内溝と、シリンダに形成され、ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、ベーン先端の断面形状を円弧状と成すと共に、当該ベーンの高圧室側の円弧の半径を、低圧室側の円弧の半径よりも小さくしたことを特徴とする。

【００１１】請求項４の発明では、密閉容器内に電動要素と、この電動要素にて駆動される第１及び第２の回転圧縮要素を備え、第１の回転圧縮要素で圧縮された冷媒ガスを密閉容器内に吐出し、更にこの吐出された中間圧の冷媒ガスを第２の回転圧縮要素で圧縮するロータリコンプレッサにおいて、第２の回転圧縮要素を構成するためのシリンダ及び電動要素の回転軸に形成された偏心部に嵌合されてシリンダ内で偏心回転するローラと、このローラに当接してシリンダ内を低圧室側と高圧室側に区画するベーンと、シリンダに形成され、ベーンを収納するための案内溝と、シリンダに形成され、ベーンに背圧を加えるため、案内溝に連通する背圧室とを備え、ベーン先端の断面形状を円弧状と成すと共に、当該円弧の中心をベーンの中央より低圧室側に偏位させたことを特徴とする。

【００１２】

【発明の実施の形態】次に、図面に基づき本発明の実施形態を詳述する。図１は本発明のロータリコンプレッサの実施例として、第１及び第２の回転圧縮要素を備えた内部中間圧型多段（２段）圧縮式ロータリコンプレッサ１０の縦断側面図である。

【００１３】この図において、１０は二酸化炭素（$CO_2$）を冷媒として使用する内部中間圧型多段圧縮式ロータリコンプレッサで、この多段圧縮式ロータリコンプレッサ１０は鋼板からなる円筒状の密閉容器１２と、この密閉容器１２の内部空間の上側に配置収納された電動要素１４及びこの電動要素１４の下側に配置され、電動要素１４の回転軸１６により駆動される第１の回転圧縮要素３２（１段目）及び第２の回転圧縮要素３４（２段目）からなる回転圧縮機構部１８にて構成されている。

【００１４】密閉容器１２は底部をオイル溜めとし、電

動要素１４と回転圧縮機構部１８を収納する容器本体１２Ａと、この容器本体１２Ａの上部開口を閉塞する略椀状のエンドキャップ（蓋体）１２Ｂとで構成され、且つ、このエンドキャップ１２Ｂの上面中心には円形の取付孔１２Ｄが形成されており、この取付孔１２Ｄには電動要素１４に電力を供給するためのターミナル（配線を省略）２０が取り付けられている。

【００１５】電動要素１４は、密閉容器１２の上部空間の内周面に沿って環状に取り付けられたステータ２２と、このステータ２２の内側に若干の間隔を設けて挿入設置されたロータ２４とからなる。このロータ２４は中心を通り鉛直方向に延びる前記回転軸１６に固定されている。

【００１６】ステータ２２は、ドーナッツ状の電磁鋼板を積層した積層体２６と、この積層体２６の歯部に直巻き（集中巻き）方式により巻装されたステータコイル２８を有している。また、ロータ２４もステータ２２と同様に電磁鋼板の積層体３０で形成され、この積層体３０内に永久磁石ＭＧを埋設して構成されている。

【００１７】前記第１の回転圧縮要素３２と第２の回転圧縮要素３４との間には中間仕切板３６が狭持されている。即ち、回転圧縮機構部１８の第１の回転圧縮要素３２と第２の回転圧縮要素３４は、中間仕切板３６と、この中間仕切板３６の上下に配置された上側のシリンダ３８、下側のシリンダ４０と、１８０度の位相差を有して回転軸１６に設けた上下の偏心部４２、４４に嵌合されて上下のシリンダ３８、４０内を偏心回転する上下のローラ４６、４８と、コイルバネ７６、７７と背圧により付勢されて先端をこれら上下のローラ４６、４８にそれぞれ当接させ、上下のシリンダ３８、４０内をそれぞれ低圧室側ＬＲと高圧室側ＨＲ（図２）に区画する上下のベーン５０、５２と、シリンダ３８の上側の開口面及びシリンダ４０の下側の開口面を閉塞して回転軸１６の軸受けを兼用する支持部材としての上部支持部材５４及び下部支持部材５６にて構成されている。

【００１８】一方、上部支持部材５４及び下部支持部材５６には、吸込ポート５５（図２。下部支持部材５６は図示せず）にて上下のシリンダ３８、４０の内部とそれぞれ連通する吸込通路６０（上部支持部材５４は図示せず）と、一部を凹陥させ、この凹陥部を上カバー６６、下カバー６８にて閉塞することにより形成される吐出消音室６２、６４とが設けられている。

【００１９】尚、吐出消音室６４と密閉容器１２内とは、上下のシリンダ３８、４０や中間仕切板３６を貫通する連通路にて連通されており、連通路の上端には中間吐出管１２１が立設され、この中間吐出管１２１から第１の回転圧縮要素３２で圧縮された中間圧の冷媒が密閉容器１２内に吐出される。

【００２０】そして、この場合冷媒としては地球環境にやさしく、可燃性及び毒性等を考慮して自然冷媒である前述した二酸化炭素（$CO_2$）を使用し、潤滑油としてのオイルは、例えば鉱物油（ミネラルオイル）、アルキルベンゼン油、エーテル油、エステル油、ＰＡＧ（ポリアルキルグリコール）等該存のオイルが使用される。

【００２１】密閉容器１２の容器本体１２Ａの側面には、上部支持部材５４と下部支持部材５６の吸込通路６０（上側は図示せず）、吐出消音室６２、上カバー６６の上側（電動要素１４の下端に略対応する位置）に対応する位置に、スリーブ１４１、１４２、１４３及び１４４がそれぞれ溶接固定されている。そして、スリーブ１４１内にはシリンダ３８に冷媒ガスを導入するための冷媒導入管９２の一端が挿入接続され、この冷媒導入管９２の一端はシリンダ３８の図示しない吸込通路と連通する。この冷媒導入管９２は密閉容器１２の上側を通過してスリーブ１４４に至り、他端はスリーブ１４４内に挿入接続されて密閉容器１２内に連通する。

【００２２】また、スリーブ１４２内にはシリンダ４０に冷媒ガスを導入するための冷媒導入管９４の一端が挿入接続され、この冷媒導入管９４の一端はシリンダ４０の吸込通路６０と連通する。この冷媒導入管９４の他端は図示しないアキュムレータに接続される。また、スリーブ１４３内には冷媒吐出管９６が挿入接続され、この冷媒導入管９６の一端は吐出消音室６２と連通する。

【００２３】次に、図２を参照しながら上記第２の回転圧縮要素３４のベーン５０周辺の構造について説明する。シリンダ３８には前記吐出消音室６２と図示しない吐出弁を介して連通する吐出ポート７０と前述した吸込ポート５５が形成されており、これらの間に位置してシリンダ３８には半径方向に延在する案内溝７１が形成されている。そして、この案内溝７１内に前記ベーン５０は摺動自在に収納されている。

【００２４】ベーン５０は前述した如くその先端をローラ４６に当接させてシリンダ３８内を低圧室側ＬＲと高圧室側ＨＲとに区画する。そして、吸込ポート５５はこの低圧室側ＬＲに開口し、吐出ポート７０は高圧室側ＨＲに開口している。

【００２５】案内溝７１の外側（密閉容器１２側）には当該案内溝７１に連通して背圧室７２がシリンダ３８内に形成されている。ここで、実施例の内部中間圧型多段圧縮式ロータリコンプレッサ１０では密閉容器１２内が中間圧となるため、第２の回転圧縮要素３４ではベーン５０の背圧として利用できない。そのため、この背圧室７２は前記吐出消音室６２に連通されており、それによってベーン５０に高圧の背圧を印加する。

【００２６】尚、前記コイルバネ７６はこの案内溝７１及び背圧室７２の外側に延在してシリンダ３８内に形成された収納部内に収納され、ベーン５０の外側に当接してベーン５０の先端を常時ローラ４６側に付勢する。

【００２７】即ち、ベーン５０は係るコイルバネ７６の付勢力と背圧室７２からの高圧によってローラ４６側に

付勢される。この場合、ベーン５０の先端５０Ａは図２の如く断面が円弧形状を呈している。また、この円弧の半径は図３の如くベーン５０の中央Ｃを境として低圧室側ＬＲと高圧室側ＨＲとで異なる値とされており、高圧室側ＨＲの円弧の半径Ｒ２は低圧室側ＬＲの円弧の半径Ｒ１より小さく設定されている（Ｒ１＞Ｒ２）。

【００２８】係る構成により、ベーン５０の先端５０Ａの表面積は、中央Ｃより高圧室側ＨＲの部分の方が低圧室側ＬＲの部分よりも広くなる。これにより、シリンダ３８内の高圧室側ＨＲの圧力（高圧）がより効果的にベーン５０の先端５０Ａに作用するように構成されている。

【００２９】以上の構成で次に動作を説明する。ターミナル２０及び図示されない配線を介して電動要素１４のステータコイル２８に通電されると、電動要素１４が起動してロータ２４が回転する。この回転により回転軸１６と一体に設けた上下の偏心部４２、４４に嵌合された上下のローラ４６、４８が上下のシリンダ３８、４０内を偏心回転する。

【００３０】これにより、冷媒導入管９４及び下部支持部材５６に形成された吸込通路６０を経由して図示しない吸込ポートからシリンダ４０の低圧室側に吸入された低圧の冷媒は、ローラ４８とベーン５２の動作により圧縮されて中間圧となりシリンダ４０の高圧室側より図示しない連通路を経て中間吐出管１２１から密閉容器１２内に吐出される。これによって、密閉容器１２内は中間圧となる。

【００３１】そして、密閉容器１２内の中間圧の冷媒ガスは、スリーブ１４４から出て冷媒導入管９２及び上部支持部材５４に形成された図示しない吸込通路を経由して吸込ポート５５からシリンダ３８の低圧室側ＬＲに吸入される。吸入された中間圧の冷媒ガスは、ローラ４６とベーン５０の動作により２段目の圧縮が行われて高温・高圧の冷媒ガスとなり、高圧室側ＨＲから吐出ポート７０を通り上部支持部材５４に形成された吐出消音室６２、冷媒吐出管９６を経由して外部の図示しないガスクーラなどに流入する。このガスクーラで冷媒は放熱した後、図示しない減圧装置などで減圧され、これも図示しないエバポレータに流入する。

【００３２】そこで冷媒が蒸発し、その後、前記アキュムレータを経て冷媒導入管９４から第１の回転圧縮要素３２内に吸い込まれるサイクルを繰り返す。

【００３３】この場合、第２の回転圧縮要素３４での圧縮動作において、本発明では前述の如くローラ４６に押し付けられるベーン５０の先端５０Ａの表面積を、シリンダ３８内の低圧室側ＬＲに位置する部分より高圧室側ＨＲに位置する部分の方が大きくなるようにしているので、シリンダ３８内の高圧室側ＨＲの圧力がベーン５０の先端５０Ａに効果的に作用し、背圧室７２からの圧力によるローラ４６へのベーン押し付け力が緩和される。

【００３４】これにより、ベーン５０が必要以上に強くローラ４６に押し付けられ、面圧が異常に高くなることを解消して、ベーン５０の先端５０Ａの信頼性を向上させることができるようになると共に、ローラ４６がベーン５０を案内溝７１側に押し込む仕事も軽くなるので、圧縮効率も改善される。

【００３５】また、ベーン５０の先端５０Ａは低圧室側ＬＲも高圧室側ＨＲも円弧状（半径は異なる）であるので、ベーン５０の先端５０Ａがローラ４６に食い込む噛みつき現象が生じることもない。

【００３６】ここで、図４は本発明の他の実施例のベーン５０の先端５０Ａの形状を示している。この場合、ベーン５０の先端５０Ａは断面が全体として半径Ｒの円弧形状を呈しているが、この円弧の中心Ｏは、ベーン５０の中央Ｃよりも寸法Ｓだけ低圧室側ＬＲに偏位している。係る構成によっても、前述同様にベーン５０の先端５０Ａの表面積は、中央Ｃより高圧室側ＨＲの部分の方が低圧室側ＬＲの部分よりも広くなる。これにより、シリンダ３８内の高圧室側ＨＲの圧力（高圧）がより効果的にベーン５０の先端５０Ａに作用するようになって、前述同様の効果を奏する。

【００３７】特に、この場合にはベーン５０の円弧半径が一様であるので、ベーン５０の加工も容易となる効果がある。

【００３８】尚、実施例では内部中間圧型多段圧縮式のロータリコンプレッサに本発明を適用したが、それに限らず、単シリンダのロータリコンプレッサにおいても本発明は有効である。また、使用する冷媒も請求項１乃至請求項４では二酸化炭素（$CO_2$）に限定されない。

【００３９】

【発明の効果】以上詳述した如く本発明によれば、ローラに押し付けられるベーン先端の表面積は、シリンダ内の低圧室側に位置する部分より高圧室側に位置する部分の方が大きくなる。これにより、シリンダ内の高圧室側の圧力をベーン先端に効果的に作用させ、背圧室からの圧力によるローラへのベーン押し付け力を緩和してベーン先端の信頼性を向上させることができるようになると共に、圧縮効率も改善することが可能となる。

【００４０】また、ベーン先端は低圧室側も高圧室側も円弧状であるので、所謂ローラへの噛みつき現象が生じることもない。特に、請求項３や請求項４の如く内部中間圧型多段圧縮式のロータリコンプレッサの第２の回転圧縮要素では、背圧室に高圧が印加されることになるので、本発明は極めて有効である。また、請求項５の如く高低圧差が大きくなる$CO_2$冷媒を圧縮する場合には、その効果は一層顕著なものとなる。

【図面の簡単な説明】

【図１】本発明の実施例の内部中間圧型多段圧縮式ロータリコンプレッサの縦断面図である。

【図２】図１の第２の回転圧縮要素のベーン部分の拡大

平断面図である。

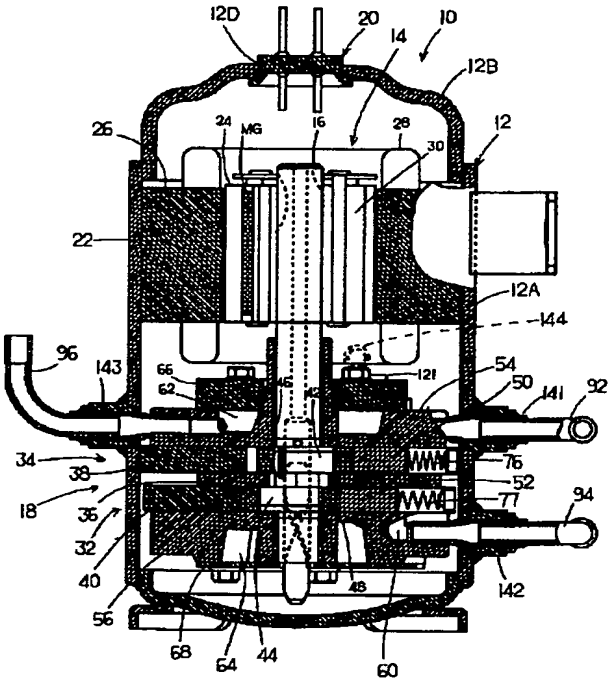
【図３】図２のベーン先端部の拡大図である。

【図４】本発明の他の実施例のベーン先端部の拡大図である。

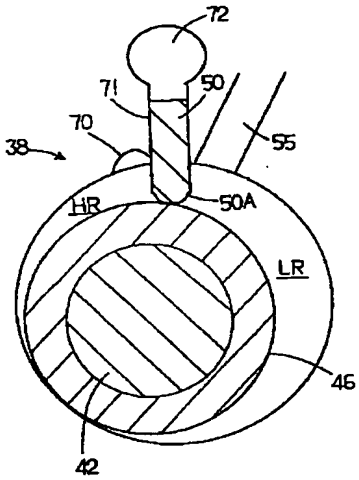
【符号の説明】

１０　多段圧縮式ロータリコンプレッサ
３２　第１の回転圧縮要素
３４　第２の回転圧縮要素
３８　シリンダ
４２　偏心部
４６　ローラ
５０　ベーン
７１　案内溝
７２　背圧室

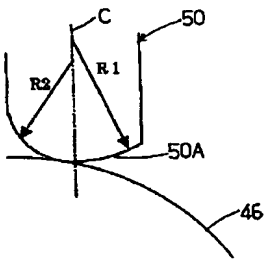
【図１】



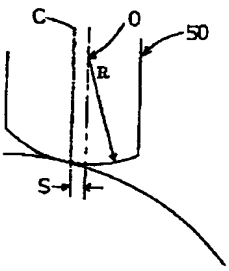

【図２】




【図３】




【図４】

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